

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification⁷ : A61K 31/445, 31/44		A1	(11) International Publication Number: WO 00/69438 (43) International Publication Date: 23 November 2000 (23.11.00)			
(21) International Application Number: PCT/GB00/01775			(81) Designated States: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).			
(22) International Filing Date: 9 May 2000 (09.05.00)						
(30) Priority Data: 9911017.3 13 May 1999 (13.05.99)	GB					
(71) Applicant (for all designated States except US): ASTRAZENECA AB [SE/SE]; S-151 85 Södertälje (SE).						
(72) Inventors; and						
(75) Inventors/Applicants (for US only): RUMSEY, William, Leroy [US/US]; 1800 Concord Pike, Wilmington, DE 19850 (US). FURR, Barrington, John, Albert [GB/GB]; Mereside, Alderley Park, Macclesfield, Cheshire SK10 4TG (GB).						
(74) Agent: PHILLIPS, Neil, Godfrey, Alasdair, AstraZeneca, Global Intellectual Property, P.O. Box 272, Mereside, Alderley Park, Macclesfield, Cheshire SK10 4GR (GB).						
(54) Title: PHARMACEUTICAL COMBINATION OF NEUROKININ RECEPTOR ANTAGONIST AND PROTON PUMP INHIBITOR						
(57) Abstract						
A combination comprising an NK-1 antagonist and an agent capable of reducing the pH of gastric juice in the gut, and pharmaceutical compositions containing the combination, and methods of using the combination for treating various diseases.						

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

PHARMACEUTICAL COMBINATION OF NEUROKININ RECEPTOR ANTAGONIST AND PROTON PUMP INHIBITOR

Field of the Invention

The present invention relates to novel combinations comprising an NK-1 antagonist 5 and an agent capable of reducing the pH of gastric juice in the gut. Furthermore, the invention relates to pharmaceutical compositions comprising such combinations and the use of such combinations and compositions in the treatment of diseases related to the gastrointestinal system.

Background

10 It is known in the art that proton pump inhibitors and H₂ antagonists may be used to decrease the pH of the gastric juice in the gut. However, neither of these prevent the relaxation of the lower esophageal sphincter. Additionally, prolonged administration of these compounds may be deleterious or give rise to side effects in certain patients. For example, the prolonged administration of a proton pump inhibitor in some cases leads to abdominal pain, 15 asthenia, constipation, dizziness, or rash.

Substance P is the physiological agent that induces, at least in part, relaxation of the lower esophageal sphincter. NK-1 antagonists are known to block the activity of substance P, thereby blocking the relaxation of the this sphincter. While blocking relaxation of the sphincter can reduce the severity of acid reflux, it does not prevent the aspiration of the acid, 20 which can lead to gastric asthma.

While various investigators have studied the use of NK-1 antagonists, H₂ antagonists, and proton pump inhibitors independently in such conditions as GERD and gastric asthma, none have proposed the combination therapy provided by the present invention. The present invention relates to a combination of an NK-1 antagonist, an H₂ antagonist, and/or a proton 25 pump inhibitor that work in concert to provide relief for those who suffer from gastric asthma, GERD, and related conditions.

Summary of the Invention

The present invention relates to pharmaceutical compositions, and in particular to pharmaceutical compositions containing a neurokinin-1 (NK-1) antagonist and a proton pump 30 inhibitor, which are useful in the prevention and treatment of diseases brought about by hypersecretion of gastric acid in the gut and/or relaxation of the lower esophageal sphincter, such as gastric asthma and gastroesophageal reflux disease (GERD). During reflux episodes in

patients with GERD, acid may be aspirated into the lower esophagus, causing esophagitis. GERD or hyper-relaxation of the lower esophageal sphincter can also allow acid to be aspirated into the airways, triggering an asthma attack, also known as gastric asthma.

Detailed Description

5 The present invention lessens the problems associated with administration of an NK-1 antagonist, an H₂ antagonist, or a proton pump inhibitor alone and/or provides a means for potentially obtaining a therapeutic effect that is significantly greater than that otherwise obtainable with the single agents when administered alone.

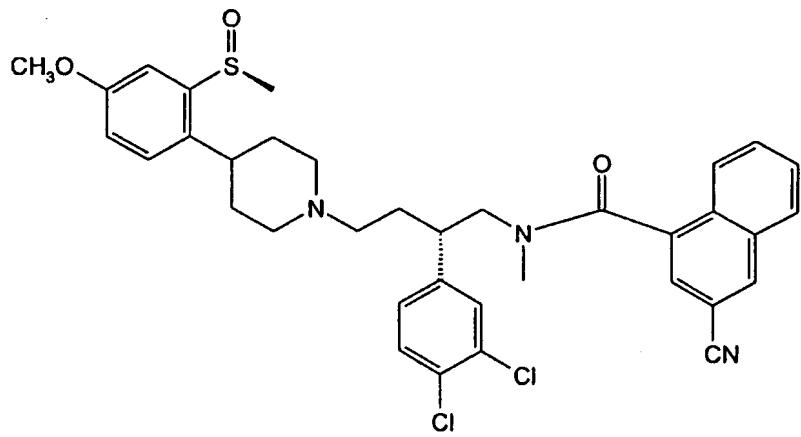
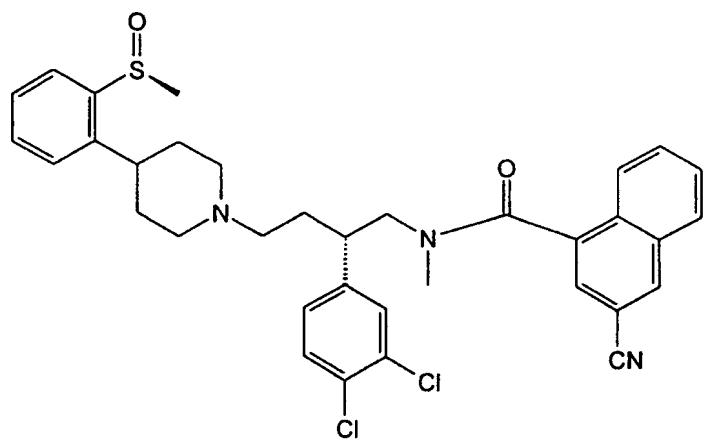
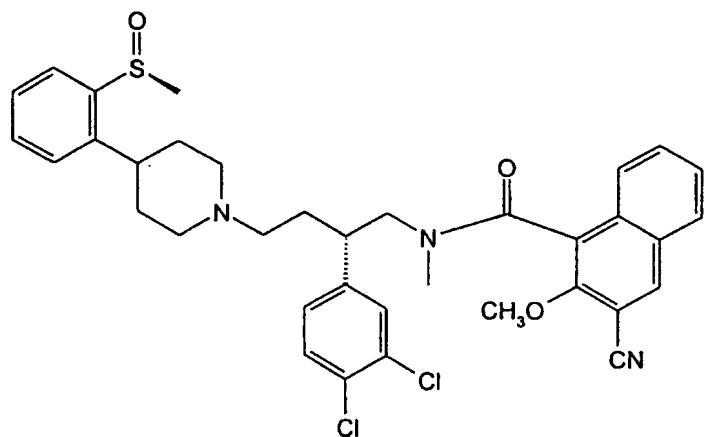
Accordingly, the present invention provides novel combinations, which comprise an
10 NK-1 antagonist and a proton pump inhibitor; or an NK-1 antagonist and an H₂ antagonist; or an NK-1 antagonist, an H₂ antagonist and a proton pump inhibitor.

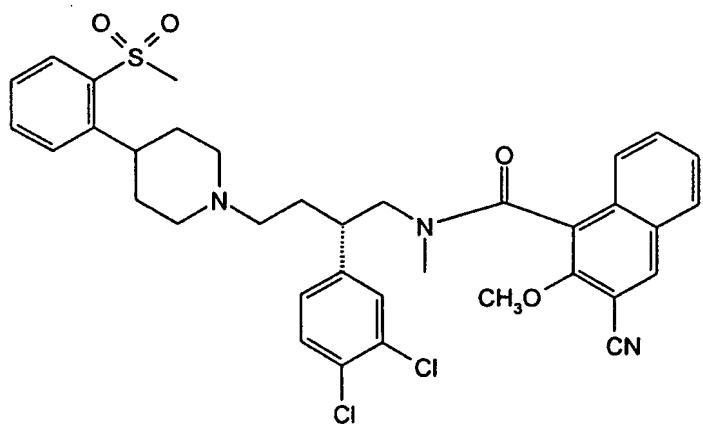
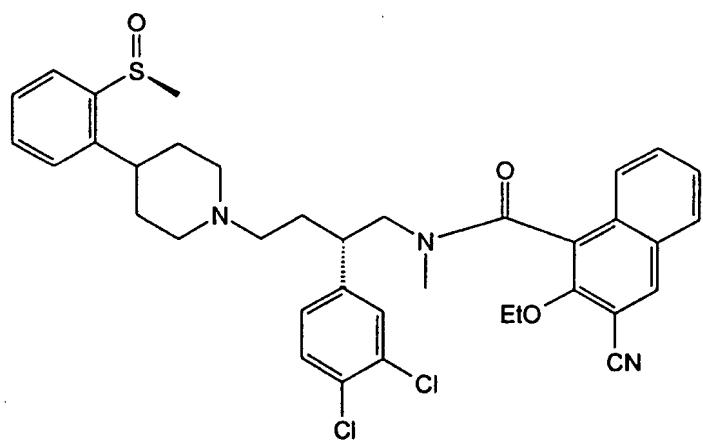
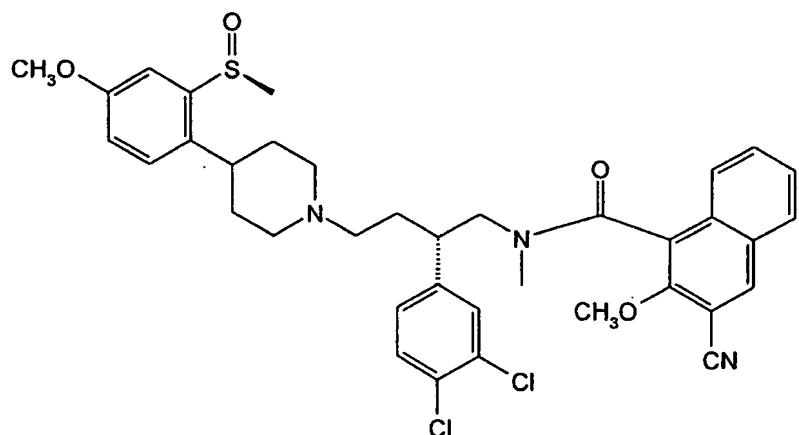
Additionally, the present invention provides pharmaceutical compositions, which comprise an NK-1 antagonist and a proton pump inhibitor; or an NK-1 antagonist and an H₂ antagonist; or an NK-1 antagonist, an H₂ antagonist and a proton pump inhibitor, together
15 with a pharmaceutically-acceptable carrier and/or diluent.

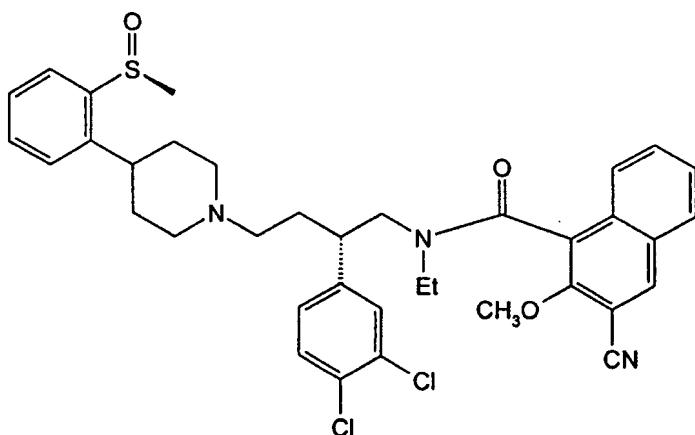
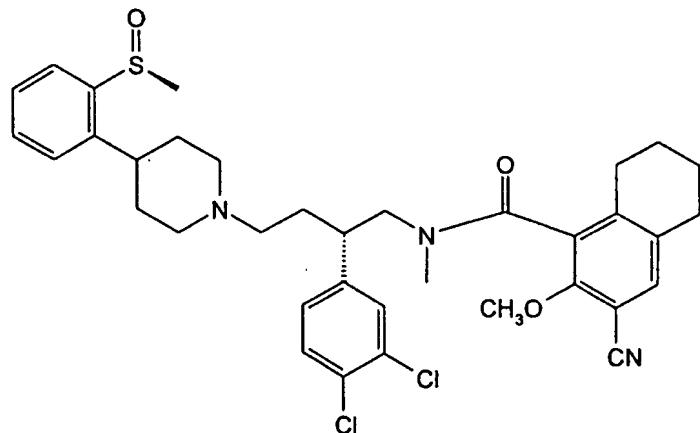
Another aspect of the invention relates to a method for treating disease related to the reflux of gastric acid in the gastrointestinal system, comprising the step of administering a therapeutically-effective amount of the one of the aforementioned combinations.

Another aspect of the invention relates to the use of one of the aforementioned
20 combinations for the manufacture of a medicament for the treatment of disease related to the reflux of gastric acid in the gastrointestinal system.

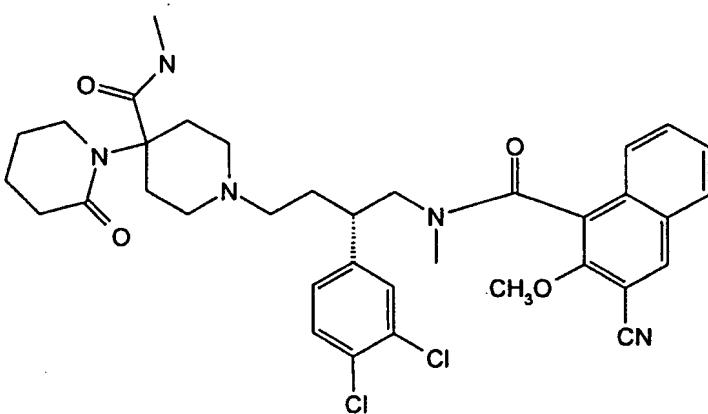
Suitable NK-1 antagonists useful in the compositions of the present invention include any compound capable of acting as an antagonist for the neurokinin-1 receptor, for example, those disclosed in United States Letters Patent Nos. 5,521,199, 5,534,525, 5,567,700,
25 5,576,333, 5,589,489, 5,602,138, 5,635,509, 5,654,299, 5,710,169, 5,731,309, 5,780,466, 5,576,317 and international applications WO 96/24582, WO 97/19060, WO 98/24447, WO 98/47513, WO 98/04561, WO 96/23787, WO 97/13514, EP 98/0302747 or pharmaceutically acceptable salts thereof. Preferred NK-1 antagonist include, for example:







, and



Other NK-1 antagonists may be identified by the following assays:

5 SP Receptor Binding Assay (Test A)

The ability of a compound of the invention to antagonize the binding of SP at the NK₁ receptor may be demonstrated using an assay using the human NK₁ receptor expressed in Mouse Erythroleukemia (MEL) cells. The human NK₁ receptor was isolated and characterized as described in: B. Hopkins, et al. "Isolation and characterization of the human

lung NK₁ receptor cDNA" *Biochem. Biophys. Res. Comm.*, 1991, **180**, 1110-1117; and the NK₁ receptor was expressed in Mouse Erythroleukemia (MEL) cells using a procedure similar to that described in the Neurokinin A (NKA) receptor binding assay below.

Neurokinin A (NKA) Receptor Binding Assay (Test B)

5 The ability of a compound of the invention to antagonize the binding of NKA at the NK₂ receptor may be demonstrated using an assay using the human NK₂ receptor expressed in Mouse Erythroleukemia (MEL) cells, as described in: Aharony, D., et al. "Isolation and Pharmacological Characterization of a Hampster Neurokinin A Receptor cDNA" *Molecular Pharmacology*, 1994, **45**, 9-19.

10 The selectivity of a compound for binding at the NK₁ and the NK₂ receptors may be shown by determining its binding at other receptors using standard assays, for example, one using a tritiated derivative of NKB in a tissue preparation selective for NK₃ receptors. In general, the compounds of the invention which were tested demonstrated statistically significant binding activity in Test A and Test B with a K_i of 1 mM or much less typically 15 being measured.

Rabbit Pulmonary Artery: NK₁ in vitro Functional Assay (Test C)

The ability of a compound of the invention to antagonize the action of the agonist Ac-[Arg⁶, Sar⁹, Met(O₂)¹¹] Substance P (6-11), ASMSP, in a pulmonary tissue may be demonstrated as follows.

20 Male New Zealand white rabbits are euthanized *via* i.v. injection into the ear vein with 60 mg/kg Nembutal (50 mg/mL). Preceding the Nembutal into the vein is Heparin (1000 units/mL) at 0.0025 mL/kg for anticoagulant purposes. The chest cavity is opened from the top of the rib cage to the sternum and the heart, lungs and part of the trachea are removed. The pulmonary arteries are isolated from the rest of the tissues and cut in half to serve as 25 pairs.

The segments are suspended between stainless steel stirrups, so as not to remove any of the endothelium, and placed in water-jacketed (37.0 °C) tissue baths containing physiological salt solution of the following composition (mM): NaCl, 118.0; KCl, 4.7; CaCl₂, 1.8; MgCl₂, 0.54; NaH₂PO₄, 1.0; NaHCO₃, 25.0; glucose, 11.0; indomethacin, 0.005 (to inhibit 30 cyclooxygenase); and *dl*-Propranolol, 0.001 (to block β receptors); gassed continuously with 95% O₂-5% CO₂. Responses are measured on a Grass polygraph *via* Grass FT-03 transducers.

Initial tension placed on each tissue is 2 grams, which is maintained throughout the 1.0 hour equilibration period. Tissues are washed with the physiological salt solution at 15 minute intervals. At the 30 and 45 minute wash the following treatments are added: 1 x 10⁻⁶ M Thiorphan (to block E.C.3.4.24.11), 3 x 10⁻⁸ M (S)-N-[2-(3,4-dichlorophenyl)-4-[4-(2-oxoperhydropyrimidin-1-yl)piperidino]butyl]-N-methylbenzamide (to block NK₂ receptors), and the given concentration of the compound being tested. At the end of the 1.0 h equilibration, 3 x 10⁻⁶ M Phenylephrine hydrochloride is added for 1.0 h. At the end of 1.0 h, a dose relaxation curve to ASMSp is done. Each tissue is treated as a individual and is considered finished when it fails to relax further for 2 consecutive doses. When a tissue is 10 complete, 1 x 10⁻³ M Papaverine is added for maximum relaxation.

Percent inhibition is determined when a tested compound produces a statistically significant ($p < 0.05$) reduction of the total relaxation which is calculated using the total relaxation of the Papaverine as 100%. Potencies of the compounds are determined by calculating the apparent dissociation constants (K_B) for each concentration tested using the 15 standard equation:

$$KB = [\text{antagonist}] / (\text{dose ratio} - 1)$$

where dose ratio = antilog[(agonist -log molar EC₅₀ without compound) - (-log molar EC₅₀ with compound)]. The K_B values may be converted to the negative logarithms and expressed as -log molar KB (i.e. pK_B). For this evaluation, complete concentration-response curves for 20 agonist obtained in the absence and presence of the compound tested using paired pulmonary artery rings. The potency of the agonist is determined at 50% of its own maximum relaxation in each curve. The EC₅₀ values are converted to negative logarithms and expressed as -log molar EC₅₀.

NK-1 antagonists useful in this invention are those that are capable of exhibiting a pK_B 25 value of greater than 7.0 in the Rabbit Pulmonary Artery Assay described above.

Pharmaceutically-acceptable salts of the NK-1 antagonist, in accordance with the present invention, are the salts with physiologically-acceptable bases and/or acids well known to those skilled in the art of pharmaceutical technique. Suitable salts with physiologically-acceptable bases include, for example, alkali metal and alkaline earth metal salts, such as 30 sodium, potassium, calcium and magnesium salts, and ammonium salts and salts with suitable organic bases, such as methylamine, dimethylamine, trimethylamine, piperidine, morpholine and triethanolamine. Suitable salts with physiologically-acceptable acids include, for

example, salts with inorganic acids such as hydrohalides (especially hydrochlorides or hydrobromides), sulphates and phosphates, and salts with organic acids.

Suitable proton pump inhibitors useful in the compositions of the present invention include any compound known to inhibit the gastric acid pump in the stomach. Examples of 5 such compounds include omeprazole, S-omeprazole, rabeprazole, lansoprazole, pantoprazole and leminoprazole, or pharmaceutically-acceptable salts thereof. Preferred proton pump inhibitors include omeprazole, (5-methoxy-2-[(4-methoxy-3,5-dimethyl-2-pyridinyl)methyl]-sulfinyl)-1H-benzimidazole) and S-omeprazole, or pharmaceutically-acceptable salts thereof.

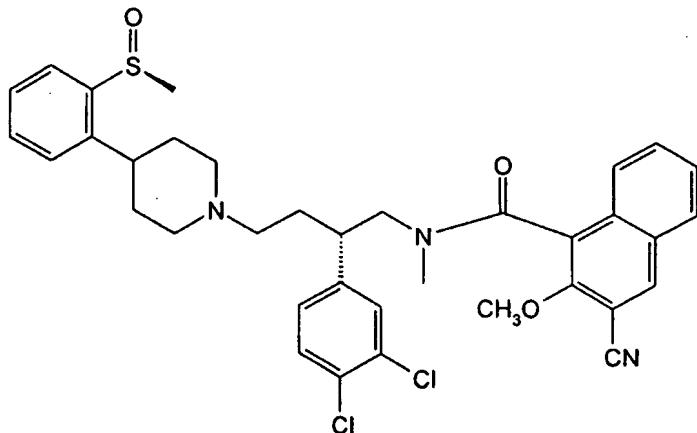
A suitable salt of the proton pump inhibitor omeprazole, or S-omeprazole according to 10 the invention is an alkaline pharmaceutically-acceptable salt. Examples of such salts include inorganic salts, such as alkali metal salts, e.g., sodium salt, potassium salt, etc., alkaline earth metal salts, e.g., calcium salt, magnesium salt, etc., ammonium salt, organic salts such as organic amine salts, e.g., trimethylamine salt, triethylamine salt, pyridine salt, procaine acid, picoline salt, dicyclohexylamine salt, N,N-dibenzylethylenediamine salt, N-methylglucamine 15 salt, diethanolamine salt, triethanolamine salt, tris(hydroxymethylamino)methane salt, phenylethylbenzylamine salt, and dibenzylethylenediamine salt.

The proton pump inhibitors used in the present invention are known compounds in the art, and methods for their preparation may be found in the literature. For example, omeprazole is disclosed in EP 5129, lansoprazole in EP 174,726, pantoprazole in EP 166,287, 20 leminoprazole in GB 2,163,747 and WO 94/27988 describes certain salts of the (-)- enantiomer of omeprazole.

Examples of H₂ antagonists are found in U.S. Patent Nos. 5,889,033, 5,656,652, 5,629,026, 5,622,980, 5,538,737, 5,374,641, 5,273,984, 5,229,418, 5,229,137, 5,221,688, 4,900,741, 4,894,372, 4,847,264, 4,808,589, 4,806,548, 4,788,184, 4,758,576, 4,749,790, 25 4,738,969, 4,732,980, 4,705,683, 4,694,008, 4,663,331, 4,652,572, 4,636,498, 4,632,927, 4,624,956, 4,622,402, 4,621,142, 4,620,001, 4,608,380, 4,607,107, 4,587,345, 4,574,126, 4,571,398, 4,567,179, 4,567,176, 4,551,466, 4,547,512, 4,540,699, 4,539,316, 4,522,943, 4,503,051, 4,492,794, 4,477,663, 4,466,970, 4,458,077, 4,452,985, 4,450,161, 4,447,611, 4,443,613, 4,439,609, 4,439,437, 4,388,317, 4,385,058, 4,383,115, 4,377,522, 4,359,466, 30 4,339,439, 4,307,104, 4,279,906, 4,279,819, 4,255,440, 4,230,717, 4,128,658, 4,090,026, however, one of ordinary skill in the art would recognize that other compounds capable of H₂ antagonism would be useful in combination with an NK-1 antagonist.

A preferred pharmaceutical composition of the invention comprises an NK-1 antagonist, or a pharmaceutically-acceptable salt thereof, and a proton pump inhibitor (including any of the proton pump inhibitors specifically named above), together with a pharmaceutically-acceptable carrier and/or diluent.

5 An especially preferred pharmaceutical composition of the invention comprises the NK-1 antagonist,



or a pharmaceutically acceptable salt thereof, and the proton pump inhibitor omeprazole, S-omeprazole, or a pharmaceutically-acceptable salt thereof, together with a pharmaceutically-

10 acceptable diluent and/or carrier.

The pharmaceutical compositions of the present invention may be administered in standard manner, for example, by oral or parenteral administration, using conventional systemic dosage forms, such as a tablets, capsules, pills, powders, aqueous or oily solutions or suspensions, emulsions, or sterile injectable aqueous or oily solutions or suspensions. These 15 dosage forms will include the necessary carrier material, excipient, lubricant, buffer, bulking agent, anti-oxidant, dispersant or the like. In particular, compositions for oral administration are preferred.

The doses of an NK-1 antagonist and a proton pump inhibitor which can be administered in accordance with the present invention depends on several factors, for 20 example, the age, weight and the severity of the condition under treatment, as well as the route of administration, dosage form and regimen, and the desired result, and additionally the potency of the particular NK-1 antagonist and proton pump inhibitor employed in the composition. In addition, account should be taken of the recommended maximum daily dosages for the proton pump inhibitors.

A unit dosage formulation such as a tablet or capsule will usually contain, for example, from 1 mg to 1000 mg of an NK-1 antagonists inhibitor and from 1 mg to 80 mg of a proton pump inhibitor. Another embodiment of a dosage formulation will contain 1 to 500 mg of NK-1 antagonist and 1 to 40 mg of a proton pump inhibitor. Another embodiment of a 5 dosage formulation will contain 10 to 400 mg of NK-1 antagonist and 5 to 20 mg of a proton pump inhibitor.

The pharmaceutical compositions of the present invention may be administered up to two times daily and preferably once a day, so that a dose of the NK-1 antagonist in the general range of 1 to 2000 mg/kg, preferably 1 to 1000 mg/kg, more preferably 1 to 500 mg/kg, is 10 administered daily and a dose of proton pump inhibitor in the general range 1 to 40 mg/kg, preferably 1 to 20 mg/kg, more preferably 1 to 10 mg/kg, is administered daily.

The present invention covers the combination of an NK-1 antagonist and a proton pump inhibitor for simultaneous, separate or sequential use in the treatment of complications related to hypersecretion of gastric acid. In one aspect of the present invention, the NK-1 15 antagonist or a pharmaceutically-acceptable salt thereof and a proton pump inhibitor or a pharmaceutically acceptable salt thereof are presented in admixture in one pharmaceutical dosage form. In another aspect, the present invention covers the administration of separate unit dosages of the NK-1 antagonist and the proton pump inhibitor in order to achieve the desired therapeutic effect. Such separate unit dosages may be administered concurrently or 20 sequentially as determined by the experienced clinician. Preferably the NK-1 antagonists and the proton pump inhibitor are both administered orally.

In another aspect of the invention there is provided a combination of pharmaceutical compositions for combination therapy of selected GERD complications, the combination consisting of pharmaceutical compositions comprising an NK-1 antagonist and a proton pump 25 inhibitor, wherein the selected GERD complications are heartburn and esophagitis.

A further aspect of the present invention comprises the use of an NK-1 antagonist and a proton pump inhibitor in the preparation of a pharmaceutical composition for use in the treatment of gastric ulcer complications.

A further aspect of the present invention comprises the use of an NK-1 antagonist and 30 a proton pump inhibitor in the preparation of a pharmaceutical composition for use in the treatment of gastric asthma complications.

A further aspect of the present invention comprises the use of an NK-1 antagonist and a proton pump inhibitor in the preparation of a pharmaceutical composition for use in the treatment of duodenal ulcer complications.

A further aspect of the present invention comprises the use of an NK-1 antagonist and 5 a proton pump inhibitor in the preparation of a pharmaceutical composition for use in the treatment of pathological hypersecretory complications.

A further aspect of the present invention is a method for treating complications due to hypersecretion of gastric acid wherein a therapeutically-effective amount of an NK-1 antagonist in combination with a proton pump inhibitor is administered systemically, such as 10 orally or parenterally.

Usually, the proton pump inhibitor will preferably be administered in amounts below that required to cause a reduction in the pH of the contents of the stomach. Where the patient to be treated suffers from pathological hypersecretion, the proton pump inhibitor will preferably be used in greater amounts, e.g. 40 to 100 mg/day. The present invention provides 15 a novel method for treating hypersecretory complications and the amounts of NK-1 antagonist and proton pump inhibitor required when administered in association with the combined therapy are lower than would normally be used, and thus, any deleterious effects or side effects are minimized.

The effect of a pharmaceutical composition of the present invention may be examined 20 by using one or more of the published models of hypersecretory complications well known in the art. The pharmaceutical compositions of the present invention are particularly useful for the prevention of, reducing the development of, or reversal of, deficits in gastric acid secretion found in hypersecretory patients.

Some of the active compounds, especially some proton pump inhibitors, may be 25 susceptible to degradation/transformation in acidic and neutral media. The degradation is catalyzed by acidic compounds and is stabilized in mixtures with alkaline compounds. The stability of the active substances may also be affected by moisture, heat, organic solvents and to some degree by light.

In respect to the stability properties of an acid-susceptible proton pump inhibitor, it is 30 obvious that an oral solid dosage form must be protected from contact with the acidic gastric juice and the active substance must be transferred in intact form to that part of the gastrointestinal tract where pH is near neutral and where rapid absorption can occur.

A pharmaceutical oral dosage form of such proton pump inhibitors is best protected from contact with acidic gastric juice by an enteric coating layer. In US-A 4,853,230 such an enteric coated preparation is described. Said preparation contains an alkaline core comprising an acidic susceptible substance, a separating layer and an enteric coating layer. In order to 5 further enhance the stability during storage the prepared formulation may optionally be packed with a desiccant.

A good mechanical stability can be obtained with an enteric coating layered tablet. WO95/01783 describes such a tablet comprising the acid labile compound omeprazole. However, only an enteric coating layered multiple unit tablet can be made divisible and 10 dispersible. A further advantage of a multiple unit dosage form is that it disperses into a multitude of small units in the stomach upon administration.

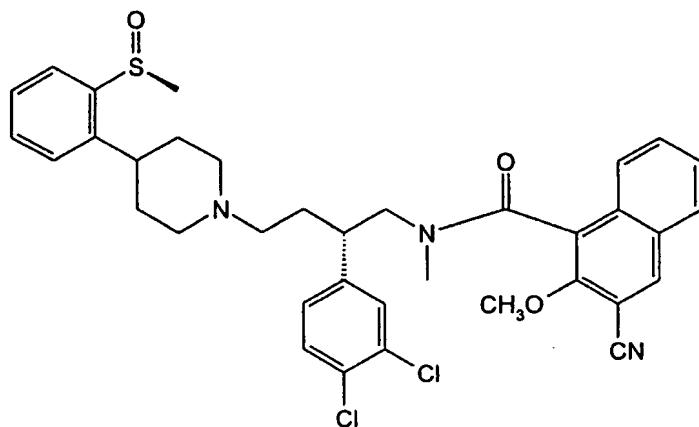
WO 96/01624 discloses tablets comprising enteric coating layered units containing an acid labile proton pump inhibitor or one of its single enantiomers or an alkaline salt thereof can be manufactured by compressing said units into tablets without significantly affecting the 15 properties of the enteric coating layer.

WO 96/01623 discloses tablets comprising enteric coating layered units containing an acidic susceptible substance in the form of omeprazole or one of its single enantiomers, such as S-omeprazole, or an alkaline salt thereof.

Suitable pharmaceutical formulations for proton pump inhibitors are also described in 20 US 4,786,505, US 5,817,338, and 5,753,265, hereby incorporated by reference.

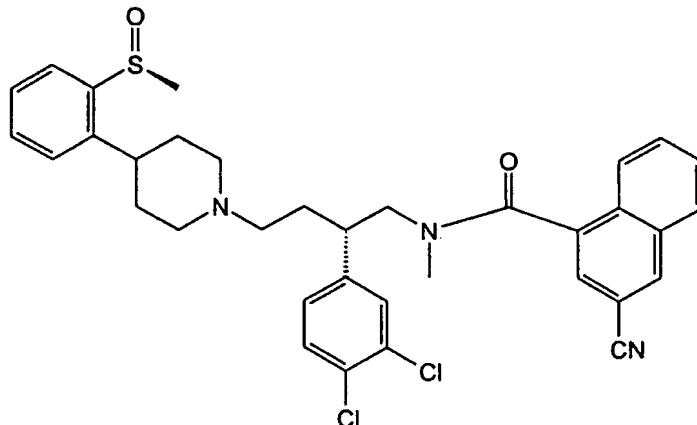
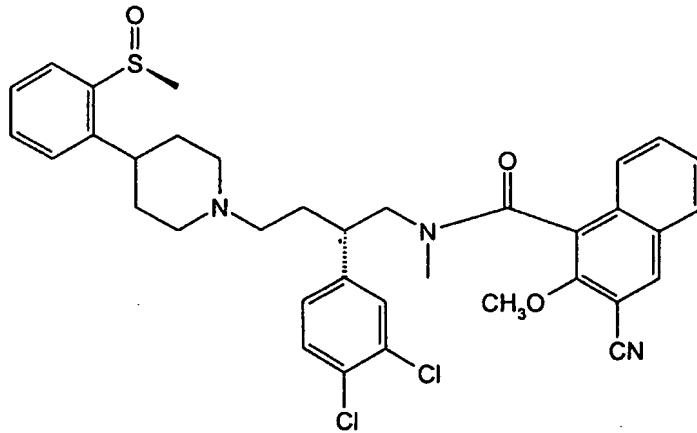
Example

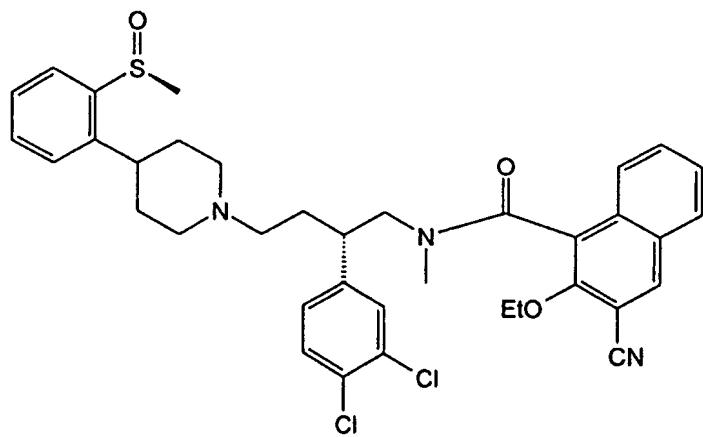
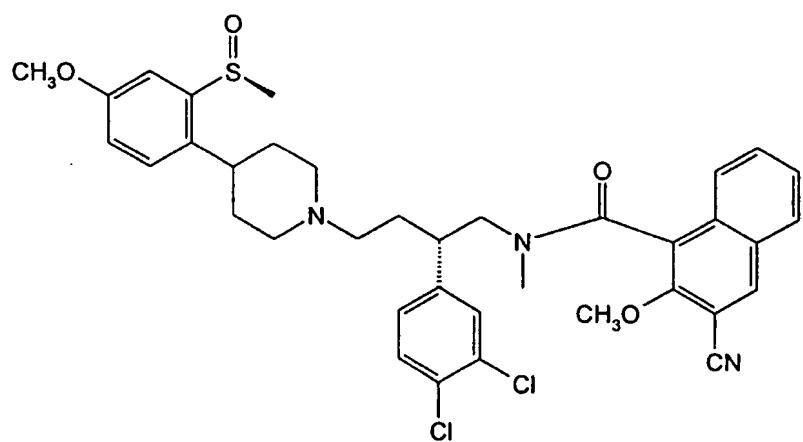
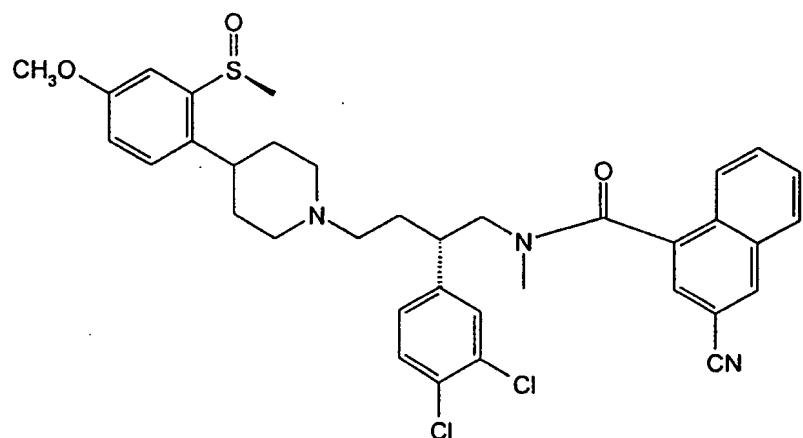
A patient suffering from GERD is treated with a combination of omeprazole (20 mg) Prilosec (tradename) and an NK-1 antagonist (400 mg) having the structure:



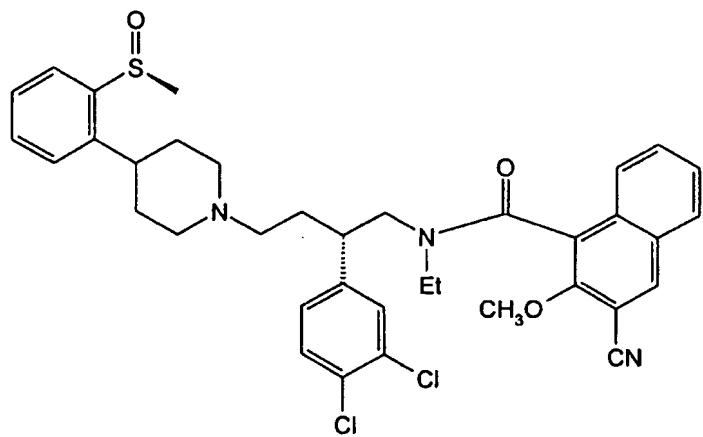
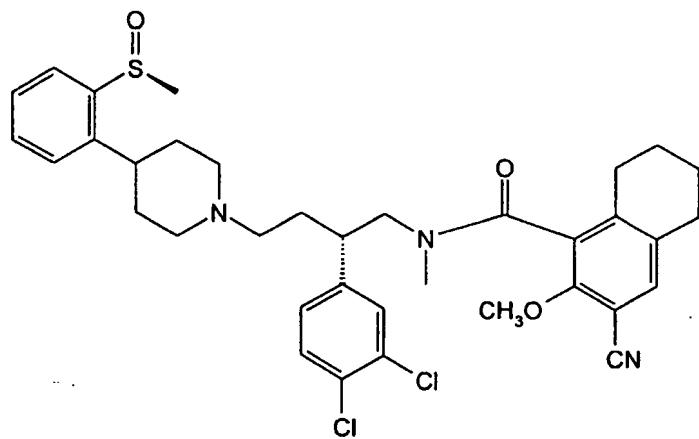
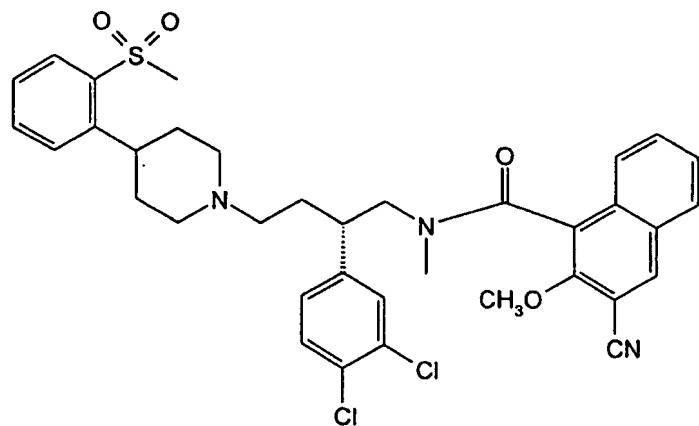
CLAIMS:

1. A combination comprising an NK-1 antagonist and an agent capable of reducing the pH of gastric juice in the gut.
- 5 2. The combination according to Claim 1, wherein the agent is a proton pump inhibitor.
3. The combination according to Claim 1, wherein the agent is selected from omeprazole, S-omeprazole, rabeprazole, lansoprazole, pantoprazole and leminoprazole; or a pharmaceutically-acceptable salt thereof.
4. A combination according to Claim 1, wherein the agent is an H₂ antagonist.
- 10 5. A combination according to Claim 1, wherein the NK-1 antagonist is any NK-1 antagonist that is capable of exhibiting a pK_B value of greater than 7.0 in the Rabbit Pulmonary Artery Assay.
6. A combination according to Claim 1, wherein the NK-1 antagonist is selected from:

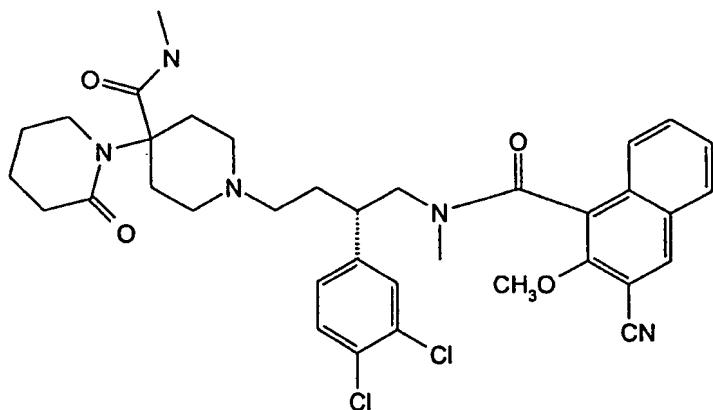




-15-



, and



7. A pharmaceutical composition, comprising:
 - an NK-1 antagonist;
- 5 an agent capable of reducing the pH of gastric juice in the gut; and
- and a pharmaceutically acceptable carrier or diluent.
8. The pharmaceutical composition according to Claim 7, wherein the agent is a proton pump inhibitor.
9. The pharmaceutical composition according to Claim 7, wherein the agent is selected
- 10 from omeprazole, S-omeprazole, rabeprazole, lansoprazole, pantoprazole and leminoprazole.
10. A combination according to Claim 7, wherein the agent is an H₂ antagonist.
11. A method for treating disease related to the reflux of gastric acid in the gastrointestinal system, comprising the step of administering a therapeutically-effective amount of a combination according to any one of Claims 1, 2, 3 or 4.
- 15 12. The method according to Claim 11, wherein the disease is selected from, heartburn, esophagitis, gastric ulcer, gastric asthma, duodenal ulcer or pathological hypersecretory complications.
13. The use of a combination according to any one of Claims 1 through 4 for the manufacture of a medicament for the treatment of disease related to the reflux of gastric acid
- 20 in the gastrointestinal system.

INTERNATIONAL SEARCH REPORT

Inte	.onal Application No
PCT/GB 00/01775	

A. CLASSIFICATION OF SUBJECT MATTER		
IPC 7	A61K31/445	A61K31/44

According to International Patent Classification (IPC) or to both national classification and IPC		
---	--	--

B. FIELDS SEARCHED		
--------------------	--	--

Minimum documentation searched (classification system followed by classification symbols)		
IPC 7	A61K	

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
---	--	--

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
--	--	--

EPO-Internal, EMBASE, WPI Data, PAJ, MEDLINE, CHEM ABS Data, BIOSIS		
---	--	--

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
--	--	--

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>"Treatment of gastroesophageal reflux disease" THERAPEUTICS LETTER, 'Online! vol. 3, 1994, XP002145877 Retrieved from the Internet: <URL:www.ti.ubc.ca/pages/letter3.html> 'retrieved on 2000-08-25! abstract</p> <p>---</p>	1-13
P, Y	<p>HARDING S M: "GASTROESOPHAGEAL REFLUX AND ASTHMA: INSIGHT INTO THE ASSOCIATION" JOURNAL OF ALLERGY AND CLINICAL IMMUNOLOGY, US, MOSBY - YEARLY BOOK, INC, vol. 104, no. 2, August 1999 (1999-08), pages 251-259, XP000913686 ISSN: 0091-6749 see conclusion page 255, column 1</p> <p>---</p> <p style="text-align: center;">-/-</p>	1-13

<input checked="" type="checkbox"/>	Further documents are listed in the continuation of box C.
-------------------------------------	--

<input checked="" type="checkbox"/>	Patent family members are listed in annex.
-------------------------------------	--

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
---	--

29 August 2000	13/09/2000
----------------	------------

Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 851 epo nl Fax: (+31-70) 340-3016	Authorized officer
--	--------------------

Gonzalez Ramon, N

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/01775

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	STEIN M.R.: "Advances in the approach to gastroesophageal reflux (GER) and asthma." JOURNAL OF ASTHMA, (1999) 36/4 (309-314). XP000937433 page 311, column 2 -page 312 ---	1-13
A	HALL J.A. ET AL: "Diagnosis and treatment of gastric motility disorders." VETERINARY CLINICS OF NORTH AMERICA - SMALL ANIMAL PRACTICE, (1999) 29/2 (377-395). XP000900801 page 387 -page 391 ---	1-13
T	CROWELL M.D.: "Editorial overview: Neurogastroenterology: Integration of central and peripheral nervous systems in disorders of GI function." CURRENT OPINION IN CENTRAL AND PERIPHERAL NERVOUS SYSTEM INVESTIGATIONAL DRUGS, (2000) 2/3 (326-328). XP000937400 abstract page 327, paragraph 2 ---	1-13
P,Y	US 6 013 680 A (KARIYA KINYA ET AL) 11 January 2000 (2000-01-11) abstract; claims 1,4,5 ---	1-13
P,Y	WO 99 59612 A (APHTON CORP ;GEVAS PHILIP C (US); GRIMES STEPHEN (US); KARR STEPHEN) 25 November 1999 (1999-11-25) abstract; claims 4-6,8-10 ---	1-13
P,Y	EP 0 968 720 A (AMANO PHARMA CO LTD) 5 January 2000 (2000-01-05) abstract; claim 3 ---	1-13
A	EP 0 426 479 A (MCNEIL PPC INC) 8 May 1991 (1991-05-08) abstract; claim 3 ---	1-13
A	WO 93 12817 A (WARNER LAMBERT CO) 8 July 1993 (1993-07-08) page 6 -page 7; claims 1,5,8 ---	1-13
E	WO 00 25766 A (ZENECA LTD ;LENGEL DAVID JOHN (US); RUMSEY WILLIAM LEROY (US)) 11 May 2000 (2000-05-11) abstract; claims 6,7 page 5, line 12-30 ---	1-13
	-/-	

INTERNATIONAL SEARCH REPORT

Inte	ional Application No
PCT/GB 00/01775	

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 00 34243 A (ASTRAZENECA UK LTD ;OHNMACHT CYRUS JOHN (US)) 15 June 2000 (2000-06-15) formula II page 7 page 18, line 18-32 -----	1-13

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 1-13

Present claims 1-13. relate to compounds/compositions defined by reference to desirable characteristics or properties, namely: "a Neurokinin-1 (NK-1) antagonist", "an agent capable of reducing the pH of gastric juice in the gut", "a proton pump inhibitor", "an H2 antagonist".

The claims cover all compounds/compositions having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT for only a very limited number of such compounds/compositions. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Independent of the above reasoning, the claims also lack clarity (Article 6 PCT). An attempt is made to define the compounds by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to the compounds mentioned in the examples and those specifically mentioned in claims 3, 6, 9, with due regard to the general idea underlying the present application.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int'l. Jpnal Application No

PCT/GB 00/01775

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 6013680	A 11-01-2000	JP 11189544	A	13-07-1999
WO 9959612	A 25-11-1999	AU 4079899	A	06-12-1999
EP 0968720	A 05-01-2000	JP 2000026311	A	25-01-2000
EP 0426479	A 08-05-1991	AT 101515	T	15-03-1994
		AU 646230	B	17-02-1994
		AU 6568990	A	09-05-1991
		CA 2028746	A, C	03-05-1991
		DE 69006684	D	24-03-1994
		DE 69006684	T	09-06-1994
		ES 2057439	T	16-10-1994
		GR 90100786	A, B	17-04-1992
		IE 64953	B	20-09-1995
		IN 171746	A	26-12-1992
		JP 3206052	A	09-09-1991
		NZ 235877	A	25-09-1992
		PT 95753	A	30-09-1991
		US 5417980	A	23-05-1995
		US 5204118	A	20-04-1993
		ZA 9008775	A	29-07-1992
WO 9312817	A 08-07-1993	AU 3247593	A	28-07-1993
WO 0025766	A 11-05-2000	NONE		
WO 0034243	A 15-06-2000	NONE		